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FOREWORD

This number of the Monthly Letter of the Bureau of Entomology inaugurates a different type of news letter, one which it is believed will be more creditable to the Bureau and more informing and stimulating to its personnel. The material has been selected from various monthly reports and is intended to give, in the form of brief notes, a current picture of the important work of the Bureau. The information included in the letter is not for publication, or further distribution, without specific permission from the Washington office. The Monthly Letter is now to be looked upon as a "house organ" issued with the thought of keeping the workers of the Bureau advised of the work under way. It is believed that this information will be beneficial to the Bureau as a unit and that it will lead to a better understanding of the functions and activities of the Bureau. With this number the mailing list has been revised and the distribution practically limited to members of the Bureau.

It is planned to give credit directly or indirectly for observations and special notes. Any original observations which may be included will, therefore, be a matter of more or less permanent record.

Should readers want further information concerning any of the statements included in the Monthly Letter, they should make inquiries through the regular channels of correspondence, i.e., through division leaders and other supervising officers.

ALFRED C. MORGAN

A. C. Morgan, Entomologist, in charge of tobacco insect investigations, with headquarters at Clarksville, Tenn., died at his home in Clarksville, July 28. Mr. Morgan graduated from Cornell University in 1904, and entered the Bureau of Entomology the same year, being associated with the division known then as the Southern Field Crop Insect Investigations. Soon after entering the Bureau he was assigned to investigations of tobacco insects and worked in this capacity up to the time of his death.

Through the death of Mr. Morgan the Bureau has lost one of its most valuable workers. He was recognized as an outstanding authority on tobacco pests and was also a specialist on Thysanoptera. His contributions to entomological literature consist mainly of economic papers on tobacco pests. He has, however, described several new genera and species of thrips.

DECIDUOUS-FRUIT INSECTS

During the present season 106 colonies of Macrocentrus ancyli-vora Rohwer, having an average of about 400 adults each, have been reared at the Moorestown, N. J., laboratory and distributed in the principal peach-growing areas east of the Mississippi River. The parasites have been shipped to their liberation points in iced containers with a remarkably small loss through mortality in transit.

At the request of Dr. Paul Marchal, of the French Ministry of Agriculture, three shipments of Macrocentrus ancyli-vora, the important oriental fruit moth parasite of the Eastern States, have been prepared at the Moorestown, N. J., laboratory and shipped to southern France. They have been received by G. J. Haeussler, of the oriental fruit moth parasite sublaboratory at Nice, and M. Balachowsky, of the French Ministry of Agriculture. The first two shipments arrived in good condition and numbers of adults have emerged in France.

H. G. Butler, in charge of the oriental fruit moth investigations at Harriman, Tenn., states that the number of moths taken in traps at the Harriman orchard was considerably less than that anticipated from the records of 1930. This may be due to a year of fewer insects, a season slightly later than that of 1930, or the fact that the larger number of traps results in a lower catch per trap. The last factor, however, would not be sufficient to explain the difference between the anticipated and the actual catches.

Three shipments of European parasites of the oriental fruit moth were received at Moorestown, N. J., in July. Three species of oriental fruit moth parasites have been reared from this material and liberated in New Jersey. The work is under the direction of Dr. H. W. Allen.

Arrangements have been made to ship Copidosoma pyralidis Ashm., a parasite of the peach budmoth, from southern Europe, where it has been recovered by G. J. Haeussler in large numbers in connection with rearing for oriental fruit moth parasites, to the California Experiment Station, for liberation in western peach orchards. Pupae of this parasite have been shipped under cold storage from Nice, France, to Moorestown, N. J., and transcontinentally by air mail, arriving at their destination in excellent condition and in the remarkable time of two days from Moorestown and twelve days from southern Europe. H. S. Smith, of the Citrus Experiment Station, Riverside, Calif., reports practically perfect emergence from shipments, and large numbers of parasites available for colonization.

Dr. John Gray, in charge of ecology of the oriental fruit moth, at Moorestown, N. J., reports that the experiments with ground screen under trees for the collection of migrating larvae are proving quite successful. During the period June 6 to 30, 112 larvae were recovered either on the ground sheet or in the Raupenleim band at the base of the peach tree. Drops from these trees were examined, and the majority found to be caused by the curculio, although there has been a moderate infestation from larvae of the oriental fruit moth. Very few moths were collected during June from the large screens covered with sticky tree-banding material. The adjacent orchards are showing a very moderate infestation, which probably accounts for the absence of some of the moths on the screen. Experiments to determine the number of twigs infested by one larva are being continued.

L. F. Steiner, in charge of the large-scale bait-trap investigations of the oriental fruit moth at Cornelia, Ga., reports that over 1,500 moths were captured during the month from the 2,400 traps in which some 100 solutions are being tested. In each of the five series two or more other baits are proving superior to the check, which is the ethyl cinnamate-medium brown sugar bait used in the large area. The tests indicate that emulsification of the aromatic has no effect on the attractiveness of the bait. They show conclusively that the use of $\frac{1}{4}$ c.c. ethyl cinnamate and certain other aromatics per trap makes a decidedly more attractive solution than where 1 c.c. is used. They also indicate that the low-grade sugars are more attractive than the medium and higher grades. The pure sugars, such as confectioners', granulated, and pure corn syrup, have proved practically ineffective.

In order to attempt to select a chemical which might prove effective against the codling moth and the oriental fruit moth, an effort is being made to draw up a list of chemical and physical properties which should be combined in the insecticide. Dr. F. H. Lathrop, Vincennes, Ind., has discussed the matter with Dr. H. R. Kraybill, chemist, of Purdue University, and has received his criticisms and suggestions. The tentative

list of properties follows:

1. The chemical should be insoluble in water at pH not less than 2.
2. It should be readily soluble in water at pH 7 to 8.
3. It should preferably have a sharp rise in solubility between rather narrow limits of pH value, on the acid side; the nearer to neutral this can be, the better.
4. There should be no tendency to volatilize at maximum outdoor temperatures, exposed to direct sunshine.
5. It should be solid at ordinary temperatures. The melting point should be well above maximum outdoor temperatures. There should be no tendency to deliquesce when exposed to moisture.
6. It should be chemically stable, so as to remain for several days exposed to ordinary summer weather conditions.
7. It should be about as toxic as nicotine.

If a chemical having such properties can be obtained, it will be interesting to test its insecticidal efficiency.

A. J. Ackerman, in charge of codling moth investigations, Bentonville, Ark., states that the high survival of codling moth larvae during the past winter, together with the ideal weather for oviposition by the spring-brood moths, has resulted in the most severe first-brood codling moth outbreak on record in this apple section. The recommendations to growers for dates for applications of the first-brood cover sprays, issued through the extension division of the Arkansas State University, have given the growers an excellent opportunity to control these worms. Mr. Ackerman comments that the Ozark district in Arkansas and Missouri on June 30, 1931, was in a more serious drought condition than at the same date in 1930.

A public service patent for tree bands has been granted to E. H. Siegler, of the Takoma Park, Md., laboratory. An additional supply of these chemically treated bands for the codling moth was made up during the month of June and the bands were distributed to several States where cooperative tests are being conducted. A final report on the work conducted at Yakima, Wash., with chemically treated bands during the season 1930 is in agreement with other reports, and shows that more than 99 per cent of the larvae in the bands had been killed. The chemically treated bands used in Indiana last season were received and examined at the laboratory, and all larvae contained in them were found to be dead.

JAPANESE BEETLE AND ASIATIC BEETLE RESEARCH

Continued quantitative surveys of larvae and other soil-inhabiting stages of the Japanese beetle were conducted throughout the month, many of them being made in localities not previously examined. These surveys show that larvae are more abundant in areas of short grass in rather low-lying ground, such as meadow pastures closely cropped by cattle or in well-kept lawns, and golf courses, especially those where the soil is of a mellow loamy texture. In other situations, such as areas of tough sod, sandy soils, rank weedy fields, and forest undergrowth, they are relatively quite infrequent.

A cooperative experiment has been arranged between the Japanese beetle laboratory, Moorestown, N. J., and Swarthmore College, Swarthmore, Pa., to study the effects of dry versus wet applications of lead arsenate as surface applications in controlling a heavy infestation of larvae in lawns and to determine the effect on the grass. Each plot is approximately 3 acres in area. A total of 25 acres is under experimentation. Mixtures of lead arsenate with and without fertilizers are to be applied.

The survey of the larvae in the campus at Beaver College, Gray Towers, Glenside, Pa., has shown that the average number of grubs in the lead arsenate-treated area was 2 to a square foot, while the average for the untreated area was 20 to a square foot. The treated grass was darker and more vigorous than that in the untreated areas. In the vicinity of Glenside there was apparently an increase in the larval population this spring as compared with the spring of 1930. It is believed that the large number of beetles captured in traps and the number of grubs poisoned by the lead arsenate have played an important role in decreasing the general infestation in the region.

Two large shipments of adults of Tiphia vernalis Rohwer, totaling 5,718 females, were received from Yokohama, Japan, during May. All of this material arrived at the Moorestown laboratory in excellent condition.

R. W. Burrell, stationed at Homebush, Australia, in his report for the month of May gave an account of a trip to Adelaide to consult with Mr. Lea, of the South Australia Museum, regarding the identities of beetles worked on during the past summer and to determine possible suitable localities for work next season in South Australia and Tasmania. Mr. Lea has collected extensively over all of Australia and was able to furnish some useful information. A few days were spent in Melbourne en route, where a badly infested golf course was visited and approximately 200 grubs secured for rearing and possible larval parasitism. In commenting on field collections Mr. Burrell stated that beetles had practically disappeared for this season, it then being (June 6) the beginning of winter.

TROPICAL, SUBTROPICAL, AND ORNAMENTAL PLANT INSECTS

A. W. Cressman, of the New Orleans, La., laboratory, has completed a report on the rate of development of the camphor scale as influenced by temperature. A method has been developed for predicting, from temperature records, the times of occurrence of different stages in the field. For three years the observed figures have matched very closely with the expected ones.

A. W. Cressman and Mrs. L. T. Kessels have made a study of the influence of light on the feeding rate of the *Vedalia* beetle. An earlier study by Cressman and Dumestre was made on beetles taken from the field, and it was found that feeding varied with the light. The present study is on a stock kept indoors in relatively dim light for a period of years. With this series the same amount of food was consumed in the dark as in the light. It is hoped that the studies on the *Vedalia* beetle may throw light on methods used in practical biological control where stocks are reared indefinitely for distribution.

Mr. Cressman has completed a study on the biology and control of the dictyosperma scale. The seasonal history has been depicted and response to temperature measured. One hundred per cent control was obtained by the use of certain oil sprays.

H. H. Bliss, A. J. Haas, and A. W. Cressman have completed a report on soap analysis in connection with oil emulsions, recommending a method based on emulsifying abilities as superior to the usual method.

The oil studies of the laboratory staff at New Orleans, in cooperation with Dr. L. H. Dawsey, assigned to the laboratory by the Bureau of Chemistry and Soils, have concentrated on several properties, as drop size, drop charge, and stability. Factors conditioning drop size have been determined and a measure for stability has been adopted, although search is being made for a more satisfactory one.

Dr. E. W. Emmart, of the laboratory at Mexico City, has completed a report on the egg form of the three economic species of *Anastrepha*, ludens, fraterculus, and striata, and has been able to give definite characters by which these species may be distinguished in the egg stage.

Dr. H. H. Darby, of the same laboratory, has completed a report on the influence of temperatures on the fruit fly. This includes both high and low temperatures and shows figures for larvae, pupae, and adults. Special attention has been given to high temperatures contemplated for sterilization of food products. The studies, especially those on low temperatures, have shown that the Mexican fruit fly is a far more hardy insect than was heretofore supposed.

W. E. Stone and C. C. Plummer, of the laboratory at Mexico City, have conducted a series of toxicity studies on adults of the Mexican fruit fly, using various copper salts, arsenicals, etc., and it has been found that the Mexican fruit fly is more resistant to these materials than is the Mediterranean fruit fly.

Mrs. H. H. Darby, of the laboratory at Mexico City, has completed studies on the duration of adult life of the different species of *Anastrepha* and has found that forms such as *ludens*, thought to have a maximum life of a little over a month, may survive for more than a year. Mrs. Darby has also completed a study on *Opius crawfordi*, a parasite of the fruit fly, showing the difference in temperature response between the parasite and its host. The study shows the ranges in which the fly would survive but the parasite would not.

The new laboratory in Honolulu, Hawaii, constructed from special plans by the University of Hawaii and leased to the Government, is of hollow tile construction and is about 100 feet long by 40 feet wide. It is entirely surrounded by a moat for protection against ants. The laboratory contains an engine room, a refrigeration room, a constant-temperature room, a sterilization room, a control room for incubators, and laboratories for the various types of investigation. It is located on the University grounds near the new Pineapple Experiment Station, which is under the direction of Dr. R. N. Chapman.

A. C. Mason, of the Honolulu laboratory, has specialized on parasite work. Large numbers of the parasites of the Mediterranean fruit fly were reared and these were brought to Washington by H. F. Willard, being fed during the trip on honey and water. Here they were taken by Senor Don Miguel Echegaray Romea of the Spanish Embassy, and after about a week's delay were forwarded to Spain under the same artificial conditions. Word has been received that the first Spanish generation of *Opius* is emerging.

T. H. Hong, of the Honolulu laboratory, has been studying the variation in morphology of the larvae of the fruit fly to determine whether races associated with hosts or climatic factors exist. Larvae possessing the smallest number of spiracular lobes and those possessing the greatest number are being bred separately.

O. C. McBride and Dr. Wm. Mitchell, of the Honolulu laboratory, have been studying the resistance of the peel of various varieties of fruit to determine whether resistance to attack by the female fruit fly is mechanical. A delicate piece of equipment has been devised to obtain the measurements.

R. H. Marlowe, of the Honolulu laboratory, has been conducting a series of toxicity studies under accurate conditions to determine how much poison spray is consumed by flies of different ages in given periods. Results show a difference in consumption between the copper salts and the arsenicals. The question as to how long flies must feed before obtaining a lethal dose is important.

M. McPhail, of the Honolulu laboratory, has been studying the diurnal activity of the adult fruit flies and finds a decided variation associated with different periods during the day. He has also been checking food sources of the fly. The Darbys, of the Mexico City laboratory, showed that the Mexican fruit fly survived for long periods on yeast, but preliminary studies indicate that the Mediterranean fruit fly may be able to utilize other materials.

Dr. Floyd F. Smith of the greenhouse-insect laboratory, Washington, D. C., has undertaken a comprehensive study of the cyclamen mite, and has already added a number of new hosts. He has found two species of mites involved. Good control has been obtained by hot water treatment and these experiments are being extended.

C. P. Clausen, of the Kuala Lumpur laboratory in the Federated Malay States, who has handled the collection and transportation of parasites of the citrus black fly, has terminated that phase of the work. Reports by P. A. Berry, of the insectary in Cuba, as well as observations by Mr. Clausen since his arrival in Cuba, show that parasite control is being rapidly established in that island. Supplies of parasites have been shipped to Panama and to Haiti.

James Zetek, of the Canal Zone laboratory, has submitted a full report on his study of the coconut situation on San Andres Island. The critical situation existing there due to scale has been brought about by a number of circumstances, including the drought. Predatory insects were found to be active, especially in the moister areas.

W. W. Yothers, of the laboratory at Orlando, Fla., has submitted a report on work done by himself and A. C. Mason in Hawaii, covering the use of high temperatures in the control of pineapple mealybugs. Later experiments conducted by the present staff in Hawaii have confirmed the vapor method as promising in this field. Mr. Yothers has finished a report covering his intensive search for the Mediterranean fruit fly in Orlando by holding fruit. Results were entirely negative.

Mr. Yothers has also submitted three completed reports by himself and A. C. Mason, one dealing with relative infestation of fruits in Hawaii by the Mediterranean fruit fly, another covering experiments in connection with the infestation of citrus fruit by the fly, especially in relation to the condition of the oil cells, and a third covering the rate of development of larvae of the fly in different fruits. This last report gives charts and data on the daily percentage of emergence on successive days after egg laying in the different fruits.

D. H. Nicholson, formerly engaged on the ecological staff at Orlando, Fla., has just submitted an extensive report on the native Trypetidae of Florida. This report marks the completion of one of the projects undertaken during the fruit fly campaign. It contains many new data in insects in this group.

Dr. R. L. Miller and I. P. Bassett, of the Orlando laboratory, have completed a report on the effect of copper and arsenical spray mixtures on citrus fruit and on the catalase activity of the leaves. The report covers work planned during the fruit fly campaign and gives a series of charts showing the relations between the quantities used and the citric acid, the soluble solids, the solids - acid ratio, the pH of the fruits, the catalase activity of the leaves, etc.

Ione P. Bassett, of the Orlando laboratory, has completed a report on the quantitative determination of soluble arsenic in various sprays and the arsenical residue on the foliage.

Dr. F. Stickney, of the Whittier, Calif., laboratory, has conducted experiments on heat treatment of date offshoots. The treated offshoots have been planted at different places, some being obtained by the Citrus Experiment Station at Riverside, Calif.

C. H. Martin, of the Whittier laboratory, has completed a report on the citrophilus mealybug. The insects have been reared at different temperatures to determine temperature effects, and at constant temperatures as compared with fluctuating temperatures. The higher constant temperatures reduced size and fecundity in the mealybug. Mr. Martin spent a week in Santa Cruz, Calif., closing out the bulb plot held there for some time.

Dr. F. R. Cole, of the Whittier laboratory, is preparing a series of sectional maps of southern California, plotting citrus plantings and red scale infestations to show resistant areas. Commissioner Ryan has been cooperating in Los Angeles County. Dr. Cole has completed his monograph on the Diptera of the West Coast, a comprehensive study of these insects comprising a manuscript of more than 1,000 pages. He has also prepared a manuscript on the ortalid genus *Euxesta*.

Dr. C. I. Bliss and L. Baird, of the Whittier laboratory, have submitted a report on physiological studies on citrus leaves in relation to fumigation. They find that the stomata give an early and sensitive index to the effect of hydrocyanic acid in fumigation.

H. R. Yust, of the Whittier laboratory, is studying, for comparative purposes, the biology of resistant and nonresistant scale stocks under the same artificial temperature. So far, no changes in development have been noted.

E. A. McGregor, stationed at Lindsay, Calif., reports that the unexpected rain in June washed off most of the sulphur on citrus trees, thus affecting thrips control, but owing to the severity of the storm the thrips population dropped about 45 per cent. Mr. McGregor reports that citrus dusting gives a control of nearly 100 per cent of the citrus gray scale.

Dr. H. H. Richardson, of the greenhouse-insect laboratory, Washington, D. C., found pyrethrins with dilute soap solution effective against the greenhouse thrips and against the chrysanthemum aphid. In a long series of greenhouse plants tested concentrations up to 20 per cent pyridine did not injure any species. Toxicity and plant tolerance studies were also made with sulfonated oxidized petroleum oil, which proved satisfactory for aphids, but unsuitable for the other insects studied.

C. F. Doucette, of the Sumner, Wash., laboratory, reports that the peak of the adult period of the narcissus bulb fly was about the end of May, all adults being dead by June 28. Mr. Doucette began experiments in vapor sterilization on June 18. One lot of bulbs treated by this method in 1930 has been dug and weighed. For all sizes a marked percentage increase over the checks was noted.

The Babylon, Long Island, laboratory has undertaken investigations of the nutritional requirements of the Eumerus larva and its possible relation to Fusarium fungus, the causal organism of basal rot. F. J. Spruijt of that laboratory also reports results of the bait-spray plots laid out as a result of the fruit fly studies in Florida. Copper salts are apparently little effective, but fluorine compounds give promise of good results.

New equipment for the laboratories of the Division has largely been confined to that needed in the new laboratory in Hawaii. A new greenhouse, however, has been added at the Babylon, Long Island, laboratory. An air-conditioning unit and a refrigeration unit have been obtained for the greenhouse-insect laboratory in Washington, D. C., the former being especially needed for vapor studies on the cyclamen mite. A double-sized air-conditioning unit has also been shipped to the laboratory at Mexico City to be employed, among other things, in studies on possible methods of treating food products.

TRUCK-CROP INSECTS

Owing to drought conditions in the desert area, the flight of the beet leaf-hopper, Eutettix tenellus Bak., as indicated by beet-field surveys and trap catches, is not nearly so heavy as was the flight of last year, according to a report from Dr. P. N. Annand, Twin Falls, Idaho. Data from traps indicate that the majority of the insects entered the cultivated area from the south, whereas last season the hoppers came from a northwestern direction. A survey has recently been conducted in that area for the presence of E. tenellus and curly top in potatoes and beans, indicating very low populations in both crops.

At the New Mexico field laboratory, Estancia, N. Mex., V. E. Romney reports that in connection with flight studies over one million leafhoppers were colored with Magdalarot dye and liberated on the sand hills near El Paso, Tex. Many samples have been taken since to indicate their direction of flight, but very little information of value has been obtained. The value of this dye as a marker has, however, been demonstrated. Under field conditions specimens remained well marked eighteen days after being sprayed. Lacquer sprayed on the leafhoppers in May was found to be entirely faded after a month of exposure.

J. E. Dudley, in charge of the pea aphid project, Madison, Wis., states that infestation of the aphid on peas in May was the heaviest which has been recorded since the project started in 1922. In one field the infestation was more than eight times as heavy as ever before recorded, totaling on one day more than 32,000 aphids per 10 sweeps of a net. As a result of the unusually heavy infestation and very hot, dry weather, the crop of peas is far below normal, probably less than 50 per cent in the southern part of Wisconsin. Many fields were not cut at all, and other fields which were cut did not yield the price of the seed. There is by far the greatest abundance of aphid predators ever noted.

One plot of peas of about four acres was swept experimentally with the aphidozer in the middle of June and over 40 pounds of aphids removed. A couple of acres were left unswept as a check. For several days the swept portion was much less heavily infested than the unswept portion, but owing to continued favorable weather and the lack of beating rains the aphids came back on the swept area until they outnumbered those on the unswept portion; the latter, however, had partially disappeared because the pea vines were nearly dead. Very little difference, if any, will be realized from the per-acre yield of the two portions.

In reporting on dusting activities for the control of the tobacco stalk borer, F. B. McKinney, who is stationed at Tempe, Ariz., states that the results of 20 or 25 tests with lead arsenate, barium fluosilicate, and other poisons indicated that the poisoned plots showed a positive reaction over the checks in every case. Mr. McKinney further states that up until about a month ago the prospects of the tobacco-plot work looked brighter than for previous years. Comparatively good stands were had in all the plots and apparently the poison work was showing up as one might hope for and expect. Now it is evident that several of the plots will have to be abandoned. The plants have stopped growing and are dying from nematode infection on the roots. This nematode infection is not new, but this is the first time it has shown up so early and to such a serious extent.

A series of field experiments with barium fluosilicate gave an excellent control of flea beetles on young tobacco, as indicated by F. S. Chamberlin, Quincy, Fla. During the first part of June this material was applied to half-grown tobacco to determine its value in checking the second brood of beetles. A high degree of control was obtained and no apparent burning resulted. Growers observing these tests became much interested and began using this material in certain shaded areas where flea beetle infestations had reached a critical point. The tobacco in these shades was one of the new disease-resistant varieties which can not withstand a sufficient amount of Paris green to effect control. The growers, realizing that their crops would suffer heavy damage without some immediate control measure, assumed the risk of a partially tested poison and applied it on eleven shaded areas containing about 75 acres. Two applications of about 4 pounds per acre were used in most instances. A control estimated at 85 to 95 per cent was obtained without any apparent burning. A similar control effected with Paris green showed a loss of 30 to 40 per cent due to foliage burn.

N. F. Howard, in charge of bean-insect investigations, Columbus, Ohio, reports that early in June it appeared that the bean beetle infestation in the vicinity of Columbus was so light that it would be difficult to obtain sufficient larvae for experimental work. A survey of the Cincinnati area was made and it was found that the bean beetle was not abundant. At Marietta and Belpre the beetle was also relatively scarce. At Athens, Ohio, the infestation is rather heavy, probably as a result of the heavy infestation which occurred late in the fall of 1930, after the crop had been picked.

S. E. Crumb, in charge of investigations of the European earwig, Puyallup, Wash., has completed three experiments in which entire city blocks have been baited. After being out two nights the bait was practically ruined owing to excessive rains. The mortality, based on the difference between the earwig population at the time the bait was applied and that found one week later, was from 83 to 91 per cent. When it is considered that mortality increases over a period of several weeks owing to the fact that the living earwigs eat the poisoned dead, the final result of these baitings should be fairly satisfactory, notwithstanding adverse weather conditions.

J. N. Tenhet, in charge of soil-insect investigations, Fairfax, S. C., states that evidence now being accumulated seems to indicate a wide divergence in larval habits between the sand wireworm, Horistonotus uhleri Horn, and the wireworm Monocrepidius vespertinus Fab. Larvae of H. uhleri are extremely active, and when placed within 18 inches of sprouting corn will almost invariably find the food in less than 24 hours. This is in marked contrast to tests conducted with M. vespertinus, where only 20% of the larvae ever found the bait when it was 6 inches away. The sand wireworm readily travels 10 or 12 feet through the soil in search of food, within 24 hours. It is possible that when food is scarce even much greater distances are traveled. Whereas larvae of M. vespertinus feed only a very short time before again wandering off through the soil, the sand wireworm seems to stick much closer to its food supply. Although much more active and energetic in the search for food, larvae of H. uhleri remain in one place much longer once the food is found. These observations suggest that soil fumigation of a baited area might give interesting results.

FOREST INSECTS

Dr. F. C. Craighead spent a week in early July with Dr. R. C. Hall, who is conducting a study of the locust borer in Ohio and adjacent States. Dr. Craighead also spent a week in July at the field station located at Asheville, N. C., going over work relating to the southern pine beetle in that region.

J. V. Schaffner, jr., who has been making observations on the spruce leaf-miner (Epinotia nanana Treit.) in Maine, reports that the infestation is much lighter than in 1930, but many moths were observed on June 15 to 18, which indicates an infestation for 1932.

A regional survey party under Dr. K. A. Salman completed its 1931 program on the Modoc National Forest July 16. The work in this area was started May 15. During this period six permanent sample plots, covering 1,920 acres, were mapped, tagged, and marked, four sample sections were cruised, and about 70 miles of strip counts were run, covering approximately 4,000 acres. The tendencies of the western pine beetle infestation for the season of 1931 were becoming evident by the 15th of July. Attacks by the summer generation indicate that there will be about four times as many trees killed by this attack as were killed by the summer generation of 1930. On the poor sites the infestation is becoming conspicuous and can be classed as epidemic. The survey party moved to the Sierra National Forest, and will be engaged on the examination of yellow pine areas in the San Joaquin watershed until August 15.

Albert Wagner and G. R. Struble started work at the Stanislaus branch of the California Forest Experiment Station June 9. A small field laboratory, equipped with a series of large screen cages, was set up at the Stanislaus base in connection with Mr. Struble's study of the fir engraver beetle.

Nutritional studies of the western pine beetle were carried on at the Berkeley, Calif., field laboratory by R. N. Jeffrey. The initial objective of these experiments is to determine whether the western pine beetle larvae will develop successfully in yellow pine phloem without the aid of microorganisms such as yeasts, which break down the sugars of the inner bark. A trip was made to the Stanislaus Forest with J. M. Miller to collect brood material and fresh yellow pine samples for this study.

A trip was made to the Sequoia and General Grant National Parks by J. M. Miller during the period from July 5 to 10. An examination was made of the control work carried on in Grant Park during May and June, 1931, where a number of large infested sugar pine trees in the camp ground areas were treated to destroy the mountain pine beetle.

J. C. Evenden, of the Coeur d'Alene, Idaho, field laboratory, spent the period from June 3 to June 19 visiting Ogden, Utah; the Targhee National Forest; Cody, Wyo.; Yellowstone Park; and Missoula, Mont. The purpose of his trip was to meet Dr. F. C. Craighead and J. M. Miller for conference and to inspect control work on the Targhee National Forest and the experimental spraying project in the Cody Canyon.

Mr. Evenden spent the week of July 12 to 18 at Sullivan Lake, Kaniksu National Forest, with W. D. Bedard, who with field assistants is making an intensive study of the mountain pine beetle and Douglas fir beetle. Mr. Bedard is securing much interesting and valuable information relative to sex ratio of emerging adults, emerging of parent adults and subsequent reattack of other trees, brood potentials, seasonal histories, etc., which will all contribute toward a better understanding of these two important forest insects and serve as a foundation upon which to base more efficient methods of control.

T. T. Terrell, of the Coeur d'Alene, Idaho, field laboratory, spent the month of July in making an extensive examination of the Yellowstone National Park to determine the extent of the mountain pine beetle infestation now present within the scenic lodgepole pine forests of that region. July 9 to 10 were spent in an aerial reconnaissance of the forested areas within the park. During this reconnaissance the groups of red-topped trees were mapped for subsequent examinations from the ground. Mr. Terrell was accompanied on the last flight of this reconnaissance by Fred Johnston, who is in charge of forestry work within the Yellowstone National Park. Glick insect traps were carried on the plane for the purpose of determining what insects were flying at different elevations from the ground. The remainder of July was spent by Mr. Terrell in examining the groups of red-topped trees observed from the air.

Through the month of June the Coeur d'Alene, Idaho, field laboratory continued studies of the burning-standing method of mountain pine beetle control in lodgepole pine. L. G. Baumhofer has been in charge of this study, assisted by F. B. Foley and L. J. Farmer, temporary field assistants.

A. L. Gibson and his assistants have been conducting a series of brood counts in lodgepole pine trees attacked by the mountain pine beetle in 1930 to secure more information relative to the potential increase which can be expected from mountain pine beetle infestations in lodgepole pine. A number of lodgepole pine trees around the battlefield within the Big Hole Basin were sprayed with crude creosote in an attempt to prevent further destruction by the mountain pine beetle of these trees necessary to the beauty of this historic site.

During the month of June all the trees about resorts and summer homes in the Cody Canyon of the Shoshone National Forest which were threatened with destruction by the spruce budworm were sprayed with a standard lead arsenate and fish oil solution, while a series of sample plots were established along the roadside and treated with different sprays. B. H. Wilford and J. M. Miller are in direct charge of this operation, assisted by a crew of six men.

Studies of the biologies of the Douglas fir beetle and mountain pine beetle are being conducted at Sullivan Lake, Kaniksu National Forest.

The most important activity of the Portland, Oreg., laboratory during the past month has been the airplane dusting for the hemlock looper outbreak in Pacific County, Wash. Some 7,200 trees are affected and it is planned to cover them with calcium arsenate dust at the rate of about 20 pounds per acre. Fifty-four tons of dust have been purchased, and a plane contracted for, calling for a minimum of 40 hours flying. This promises to be the largest undertaking of its kind in the control of forest insects on a commercial basis. The work is being carried on and all funds supplied by private interests.

On June 10 R. L. Furniss reported for duty at Klamath Falls, Oreg., where he was joined by J. A. Beal, and preparations were then made for putting the log examinations for the study of bark beetle infestation on a continuous basis.

The mountain pine beetle control work on Crater Lake National Park was completed on June 20, with the exception of the rolling of a few infested logs, which had to wait for warmer weather. The work is in charge of W. J. Buckhorn.

A heavy wind in April blew down an immense quantity of timber all through the Cascade Range. J. A. Beal examined one such area in Klamath County, Oreg., and reported that the attractive influence of these logs may result in concentrating attacks of the western pine beetle in the vicinity. It is not expected that the down logs will produce normal broods.

Since June 17 most of the work of the locust borer control project at Columbus, Ohio, has been confined to the establishment of sample plots in cooperation with the Forest Service crew making a study of yield and volume in black locust. Results indicate that locust borer attack is definitely related to crown class, the most thrifty trees showing least attack and the least thrifty showing most attack.

An outbreak of the periodical cicada (Tibicina septendecima L.) is reported from Ohio, where Brood V of Marlatt has emerged in the eastern part of the State. The cicadas are very abundant in the eastern part of Ross County, especially southeast of Chillicothe on the Scioto Trail State Forest. Adults were collected on this area on June 17. This insect is causing serious injury to young trees of all species in that locality by oviposition in the twigs, which later die and in many cases break off. Some black walnut trees were noted here that had 100 per cent of the foliage killed as a result of oviposition by this insect.

At the beginning of June Scotch pine plantations at Mount Toby, Mass., and the Harvard Forest were heavily attacked by the white pine weevil. Discussion with the Harvard Forest staff brought out the unanimous belief that the variety of Scotch pine in these plantations (Riga strain) would under certain conditions be vigorous enough to smother the young larvae after hatching and to recover completely. Accordingly preliminary observations have been made and the foregoing premise seems to be true. In five plantations examined no dead leaders have been found. This study will be continued throughout the summer.

Dr. H. J. MacAloney, in charge of the Amherst, Mass., laboratory, reports a rather heavy attack of the larch case bearer, and the characteristic browning of the needles was present in parts of the White Mountains this spring. During the third week in June a heavy flight of moths was observed.

During the period June 2 to 5 the joint meetings of the North Carolina and American Forestry Associations were held in Asheville, N. C. The work of the Appalachian Forest Experiment Station and its co-operators was reviewed by the Appalachian Forest Research Council, approved, and certain resolutions passed to aid in furthering this work. As a part of the program, the results obtained from studies of the southern pine beetle during the past five years were briefly outlined by the station leader. The Council, among other resolutions, passed one relating to the co-operators in Forest Pathology and Forest Entomology, requesting additional funds for personnel and experimental work being done at Asheville.

Ralph W. Caird, Field Assistant, from the University of Michigan, a Pack Fellowship student, arrived at the Asheville, N. C., laboratory on June 8 to conduct some physiological studies in connection with trees attacked by the southern pine beetle.

The effects of new chemicals in killing broods of the southern pine beetle in recently attacked trees and their efficacy in preserving poles from subsequent insect and fungus attack are being noted at the Asheville, N. C., field laboratory. Normal pine, oak, and hickory trees have also been injected by the saw-kerf method to determine the possibilities of this manner of preserving poles and small stock from attack by insects. Such stock is used for the manufacture of rustic furniture and for the construction of log cabins. The studies are being conducted by R. A. St. George, assisted by Ralph W. Caird, B. J. Huckenpahler, Noel Wygant, and Lyall Peterson.

R. A. St. George and B. J. Huckenpahler are also engaged in series of treatments of tulip trees to determine which method is most effective in causing the rapid drying of the wood, without injury, and at the same time preventing or eliminating most ambrosia beetle damage. The treatment consists of girdling and of felling trees. A part of the felled trees were limbed, the rest had their branches left intact. A similar study is being conducted at Bogalusa, La., in cooperation with the Southern Forest Experiment Station and the Office of Forest Pathology, Bureau of Plant Industry, located at New Orleans, La. In this instance sweet gum is the species of wood being used.

R. Wooldridge, of the gipsy moth and brown-tail moth laboratory, Melrose Highlands, Mass., reports that most of the damage he has seen from the brown-tail moth was in southern New Hampshire. He also reports heavy feeding by the satin moth on a few willows at Fitchburg, Mass. Other members of the staff have noted defoliation in New Hampshire, northeastern Massachusetts, and Maine, it being most general in southeastern New Hampshire and in Maine near the coast. The feeding of the satin moth is more pronounced on willows than on poplars.

Judging by observations made by members of the gipsy moth laboratory, and by reports received at the laboratory, southeastern Massachusetts is the only section of New England where there were areas seriously defoliated by the gipsy moth this year.

Accompanied by entomologists of the States concerned, Dr. M. T. Smulyan, of the gipsy moth laboratory, took a trip through southeastern New Hampshire and southwestern Maine during the latter part of June and early July to determine the extent of the brown-tail moth infestation. It is in this area that most of the injury by this species has taken place during recent years. Dr. Smulyan states that the infestation this year was much lighter in New Hampshire than it was last year. In Maine it was somewhat lighter than last year, though in the more heavily infested area it was slightly heavier. Dr. Smulyan also made observations of the brown-tail moth fungus (Entomophthora aulicae Reich.).

The last shipment of tachinid parasites of the gipsy moth to reach the gipsy moth laboratory from Europe this year arrived on July 17. Approximately 170,000 puparia were received. Of these about 150,000 were Phorocera agilis R. D., which has so far been recovered only from the vicinity of colony sites in Boxford, Mass. It was put out in Boxford in 1927 and 1928, and a few puparia have since been obtained each year from collections of gipsy moth caterpillars made in that town.

During the month of July shipments of puparia of Compsilura concinnata Meig., were sent to Barbados, B. W. I., and to the State of Washington, from the gipsy moth laboratory. It is being sent to Barbados with the idea that it may establish itself there as an enemy of armyworms and cutworms, and in the State of Washington it will be liberated in a satin moth infestation. Adults of Eupteromalus nidulans (Thom.) were also sent to the State of Washington for liberation in an area where the satin moth occurs.

Liberations of two species of parasites of the European pine shoot moth, received from Austria, were made by the gipsy moth laboratory in July. One species belongs to the genus Orgilus (Braconidae), and the other has been identified as Cremastus interruptor Grav. (Ichneumonidae), which was successfully introduced into Canada from England in 1928. Colonies of the latter species were put out in Brookline and Hingham, Mass., while the Orgilus adults were liberated in Brookline.

A small liberation of a species of Phanomeris (Braconidae) was made in an infestation of Phyllotoma nemorata Fall., at North Conway, N. H., in July. Small numbers of two other parasites of this imported leaf-mining sawfly on birch had already been colonized by the gipsy moth laboratory this year. The three parasites were received from Austria.

Last March collections of cocoons of the oriental moth (Cnidocampa flavescens Walk.) were made at 13 points in and near Boston, Mass. where adults of Chaetexorista javana B. & E., issuing from material received from Japan, were liberated in 1929 and 1930. By the end of July adults of the tachinid fly had issued from 12 of the 13 collections. Two of the 13 collections came from the vicinity of 1929 colonization points, and the remainder from areas where liberations were made in 1930.

Rearing work to secure parasites to send to America was started with P. dispar at Galgamacsa, Hungary, on a large scale on May 25. By the end of the month 64,000 larvae had been collected, but parasites had not started to issue. Similar work was begun at Oszro, Hungary, on May 29.

The reported Rhyacionia buoliana infestation at Berndorf, Austria, was found to be an infestation by Evetria duplana (Huebner.) Small larvae were feeding between the buds on the sunny sides of the trees.

On May 26 large scale rearing work to obtain parasites of Rhyacionia buoliana Schiff. was started at Oberpullendorf, Austria. Mr. W. F. Sellars, of the Budapest, Hungary, sublaboratory, directed the work. By the end of May 48,775 apparently infested pine shoots were collected. Examination of the shoots showed that, because the feeding larvae often leave one shoot and bore into another, many of them were empty. In all 10,800 larvae, 11,165 R. buoliana pupae, and several hundred parasites were obtained. The parasites were sent to the Melrose Highlands laboratory each day.

C. F. W. Muesebeck, R. C. Brown, and D. L. Parker, of the gipsy moth laboratory, have taken care of shipments of parasites of Rhyacionia buoliana which reached the laboratory from Oberpullendorf, Austria. Pupae of R. buoliana containing large numbers of chalcidoid larvae--possibly a species of Copidosoma--have also been received from Austria.

Mr. Muesebeck reports that 169 adults of Brachymeria intermedia Nees, a pupal parasite of the gipsy moth not yet established in the United States, were liberated in Plymouth, Mass., on June 18. These specimens were received from Yugoslavia in the summer of 1930 and carried through the winter at the laboratory.

Mr. Muesebeck also states that 50 adults of Mesoleius tenthredinis Morley, a parasite of the larch sawfly (Lygaeonematus erichsonii Htg.) were received from the Parasite Laboratory of the Canadian Entomological Branch, June 24, and have been liberated in Lunenburg, Mass. This parasite was introduced into Canada from England several years ago and has become established there.

CEREAL AND FORAGE INSECTS

At the request of State officials of Utah, Idaho, and Nevada, George I. Reeves and Dr. J. C. Hamlin attended the annual meeting of the Shippers' Advisory Board at Ogden, Utah, on June 22. At this meeting resolutions based on the alfalfa meal investigations by this Division were adopted.

An exchange of species of Empoasca and of literature pertaining to this genus was recently completed with Prof. Guido Paoli, Chivari, Italy, at his request.

J. W. Ingram, of the sugarcane insects project at New Orleans, La., made a two-day trip to look for Aphis maidis Fitch on sugarcane. Small numbers were found on sugercane but many were found on sorghum. This aphid transmits the mosaic disease of sugarcane.

W. A. Douglas, who is making investigations of rice insects at the New Orleans field laboratory, gave a talk on the rice water weevil at a farmers' meeting at Abbeville, La. The farmers are coming to the conclusion that this insect is of but slight importance. This realization will save them money which would otherwise be spent in control measures.

A report from the European Parasite Laboratory, Hyères, Var, France, states that Exeristes roborator has been found in the Maures Mountains near Hyères in an isolated valley at La Verne at an altitude of about 1,970 feet, where it exists as a parasite on an (as yet) unknown lepidopterous borer in the stems of Asphodel (A. microcarpus Vir).

Lee Seaton, of the San Antonio, Tex., field laboratory, spent two half days in June searching for larvae and pupae of the sorghum webworm in fields where last fall from one hundred to two hundred specimens could be taken from a single head of sorghum, and brought back less than twenty larvae.

On June 19, 20, 21, and 22 Mr. Seaton was sent to the heavy sorghum-growing section near Taft and Robstown, Tex., to search for specimens of the sorghum midge. Owing to scarcity of the insect he did not collect a single specimen.

An extensive campaign to control grasshoppers on the range lands of the great marshes in Lake and Klamath Counties, Oreg., was in progress in late May and early June. The funds, reported to be \$16,000, were provided by the Oregon Legislature, the Indian Service, and other agencies. The campaign was directed by the County Agent of Klamath County. The Chewaucan Marsh, in Lake County, when seen June 18, appeared to have been freed of most of the grasshoppers. Other areas, the Sycan and Upper Klamath Marshes, were not seen, but less success was reported. The rainy weather interfered with obtaining direct information because of the condition of the mountain roads.

Studies on the pollination of red clover were undertaken at the request of Eugene A. Hollowell, of the Bureau of Plant Industry, at the Forest Grove, Oreg., laboratory. Observation in one 7-acre field, cut for hay on June 1 and at time of observation about 5 per cent in bloom, showed a record of 33 bumblebees in 30 minutes. Most of the bees were Bombus californicus Smith, a few were B. appositus Cress., and a very few B. occidentalis Greene. Fields cut at a later date will be chosen for further study.

An outbreak of the variegated cutworm occurred the first week in June, in which alfalfa, sweet clover, and garden crops were much damaged. Considerable damage from this species occurred in Dallas County, in the Texas panhandle.

A field survey of the Hessian fly was made by the staff of the Wichita, Kans.. laboratory in the States of Kansas, Missouri, Nebraska, and Oklahoma, and in the southern part of Iowa. Four men took part in the survey and the traveling was done by automobile at very reasonable expense. In its course 295 fields were examined in 134 counties. A parasite survey was made which started June 1 and covered west central and northeastern Missouri, south central Iowa, and northeastern Kansas. The distance traveled was 1,390 miles, and during the survey 55 examinations were made and material collected expressly for parasite work. More than half the month of June was spent in connection with experiments to determine the correct time of sowing wheat to avoid damage by the fly.

An outbreak of the Mormon cricket has been reported in Franklin County, Wash. The crickets had damaged a strip from 8 to 10 feet wide along the north side of a winter wheat field. Most of the crickets were in the grasslands, especially where sage brush occurred, above 1,000 feet. The wheat will be harvested with combines as soon as the weather permits and no further damage is expected this year.

The serious grasshopper outbreak in South Dakota and Nebraska required the major attention of the Bozeman, Mont., field laboratory during June. Melanoplus differentialis Thos. and M. bivittatus Say are the dominant species, with a mixture of less abundant species. After a request for help from Senator Norbeck and Representative Williams of South Dakota, R. L. Shotwell and Fred Morton, of the Bozeman laboratory, went into the infested area and cooperated with A. L. Ford, Extension Entomologist, in meeting the situation. Field tests were conducted to try out the various baits being used and to determine the best time to scatter baits. Valuable data were also obtained on migrations, food preference of grasshoppers, and cost of control operations. The work of Messrs. Shotwell and Morton was highly praised by the State and county authorities. A single instance of saving was the discovery by Mr. Shotwell that a commercial grasshopper bait which was being used in carload lots contained too low an arsenic content. Had the material been put out as planned, the poor results would very likely have wrecked the entire campaign.

At the request of A. L. Strand, State Entomologist for Montana, J. R. Parker, of the Bozeman, Mont., laboratory, accompanied him on a survey of grasshopper conditions in western Montana in June. Armies of "warrior grasshoppers," Carnula pellucida Scudd., were found doing damage in Lake and Flathead Counties and the county agents in these counties were aided in starting control campaigns. At Lakeview, Mont., the first hatching of C. pellucida was observed on June 16.

At the request of the Washington office C. R. Ainslie, Collaborator, visited the grasshopper-infested areas of northern Nebraska the latter part of June and first week in July. He rendered valuable assistance to the county and State workers in the organization of control campaigns. Although Mr. Ainslie is in retirement status he retains an active interest in entomological work.

COTTON INSECTS

Among the more interesting records of insects taken on day flights by airplane in the upper air during the month of June, 1931, are the following:

200 feet	A species of Lampyridae (firefly, alive)
200 feet	A species of Bremidae (bumblebee, alive)
200 feet	<u>Stictocephala festina</u> Say (3)
1,000 feet	<u>Diabrotica vittata</u> Fab.
200 feet	<u>Ceratomegilla fuscilabris</u> Muls.

A specimen of Stictocephala festina flew into the cockpit of the plane at the altitude of 2,000 feet, and one at the altitude of 4,000 feet. The specimens were captured and preserved. On days and nights when flights were made to collect insects sweepings were made to collect insects on the ground. These insects were preserved, and will be used later when making comparative studies of the insects in the upper air and on the ground.

Observations in the Red River Valley at Shreveport, La., on June 25, 26, and 27 revealed the fact that both Lygus pratensis L. and Psallus seriatus Reut. were in the cotton in sufficient numbers to cause severe injury. In one locality, 12 miles south of Shreveport, 500 sweepings were made in five different fields of cotton. The average per 100 sweeps in these fields was: P. seriatus 102.8, L. pratensis 49.6, and A. rapidus 0.8. The field with the heaviest damage averaged 157 Psallus and 73 Lygus. The cotton in this field was approximately 2.5 feet high with no fruit on the plants. Considerable dusting with sulphur for hopper control is being done in this valley.

T. C. Barber, of the Brownsville, Tex., laboratory, reports that in connection with the infestation of the cotton leaf perforator there seems to be some agency which they have not been able to isolate that is causing a great reduction in the miners in the cotton leaves. In a number of cases the miners are dead within the mines but quite frequently the mine is empty, with no corresponding larval infestation on the foliage of the cotton plant to account for the missing miners.

Dr. F. A. Fenton reports that observations made on the pink bollworm in the vicinity of Presidio, Tex., indicate that the first generation of this insect is passed in squares and that the feeding period of the larvae in squares is much shorter than in bolls.

INSECTS AFFECTING MAN AND ANIMALS

The latest reports from the Fargo, N. Dak., field laboratory state that horse bots continue to be a serious pest throughout North Dakota, Minnesota, and Manitoba, Canada.

Mr. Wesley G. Bruce, of the field laboratory at Fargo, N. Dak., reports that during the month of June the horn fly made its appearance in the vicinity of Fargo and that it was not uncommon to see four or five hundred on one animal. Whether or not the color of the animal has anything to do with the presence or absence of horn flies, it seems quite evident to him that a black animal is more heavily infested than a white one.

Mr. Bruce also reports a heavy infestation of lice on cattle in the vicinity of McClusky, N. Dak.

A survey through the Red River Valley and north to Lac du Bonnet, Canada, reveals the presence of cattle grubs in greater numbers in the valley and in Manitoba, Canada. From Park River, Gilby, and Milton, N. Dak., and throughout the Red River Valley, come reports of increased infestation.

In the vicinity of Fargo mosquitoes were noticeably inactive up until about the middle of June but since that time have appeared in large numbers, causing considerable annoyance to man.

During the latter half of June the stable fly has caused considerable annoyance to livestock in North Dakota, especially at Fargo, Grand Forks, and Park River.

D. C. Parman reports that during the month of June adults of Cochliomyia macellaria Fab. were abundant in the vicinity of Uvalde, Tex. Screw-worm cases were common but apparently no more than normal for this time of year. The trapping test for blowflies, begun early in the summer, has been continued at the Uvalde laboratory.

The systematic operation of 270 flytraps located on an area of approximately 175 sections of ranch land in Menard County, Tex., which was begun early in the summer, is being continued.

Reports by H. H. Stage of mosquito investigations at the Portland, Oreg., field laboratory state that larvae of Aedes vexans Meig. and A. aldrichi Dyar & Knab were abundant in the Portland district wherever flood waters of the rivers extended. Early in June A. vexans became annoying to a greater or lesser extent over the entire peninsula and Hayden Island. It is thought that this influx had probably come from a prolific breeding area from 7 to 10 miles down the river in Clark County, Wash. These two species are also reported to be very numerous at Wahkeena Falls. In the Klamath Falls, Oreg., district Aedes dorsalis Meig., Culex tarsalis Coq., Culiseta inornatus Will., and one undetermined species of Aedes were taken. Occasional specimens of Anopheles quadrimaculatus Say were seen, but of the mosquito population perhaps 80 per cent were A. dorsalis. At Lakeview, in the Chewaucan Valley, Oreg., Aedes flavescens Müll., Aedes dorsalis, Culex tarsalis, and Culiseta incidens Thoms. were numerous, with A. flavescens making perhaps 85 per cent of the population. In the south Warner Valley the only species taken was Aedes flavescens and it was not as abundant as usual because of lack of irrigation water.

A report by R. W. Wells from the Galesburg, Ill., field laboratory states that screw-worm flies were first found there this season on June 12. By the end of the month they were very common.

Gastrophilus nasalis L. and G. intestinalis DeG. began ovipositing in the region of Galesburg, Ill., about the middle of June. G. nasalis were found in abundance on June 21, 50 eggs being taken from one horse on that date. Adults of G. haemorrhoidalis L. were active on June 21 and very annoying on one farm by June 23. Little has been known as to how larvae of G. nasalis gain entrance to the host. It has been found that the eggs hatch at room temperatures without moisture or friction. Larvae so hatching were placed on the hair of the horse. They crawled actively, but none attempted to penetrate.

On June 8 R. W. Wells secured the stomach of a western horse which contained 62 well developed larvae of G. intestinalis. A few of these larvae were dissected and in the digestive tracts were found varying quantities of the red blood of the horse. The lesions of the horse's stomach indicated that the blood of the horse is available to the larvae, if not a necessary part of their food.

On June 18 G. H. Bradley, of the mosquito research project, Orlando, Fla., made a trip to Osceola, on the St. Johns River, where malaria was reported to be serious last year. Anopheles mosquitoes were quite scarce, but both A. quadrimaculatus and A. crucians were collected.

T. E. McNeel, of the Orlando laboratory, reports that in several large lakes examined by him the percentage of large Mansonia mosquito larvae is decreasing. The adult population is also decreasing, as indicated by trap and hand collecting.

STORED-PRODUCT INSECTS

W. D. Reed, of the tobacco insect laboratory, Richmond, Va., reports that the spring brood of tobacco beetles began to emerge in the Richmond and Norfolk districts during the first week of June. Many experiments in fumigation for the tobacco beetles are now being conducted, observations having been made in more than 5,000,000 cubic feet of tobacco storage space during the month.

An interesting infestation of red spiders (Tetranychus telarius L.) in one of the public libraries in Washington was investigated by Dr. R. T. Cotton and was found to have originated in heavily infested foliage of trees and shrubbery growing near the building. The trees had recently been sprayed with an arsenical spray which had caused considerable burning of the foliage. The drying up of the foliage may have caused the red spiders to migrate into the near-by building. Several similar infestations have been reported during the summer.

A. O. Larson, from the field laboratory at Corvallis, Oreg., reports that there has been a decided reduction in the number of pea weevils in the field peas that have been dusted by airplane.

TAXONOMIC INVESTIGATIONS

Foster H. Benjamin has joined the taxonomic staff of the Bureau of Entomology and will specialize on the classification of cutworm moths. He will be located in the Division of Insects of the National Museum, where he will have access to the collections of Lepidoptera.

On July 1 Dr. T. C. Buck, Assistant Director of the Bureau of Bacteriology, Health Department, Baltimore, Md., consulted C. T. Greene, in the section of Diptera, concerning Chironomidae.

Glenn Richards, of Cornell University, spent July 17 working on the collections of Lepidoptera in the National Museum.

On July 20 Geo. P. Engelhardt, of the Brooklyn Museum, called at the Division of Insects in the National Museum to see the specialists on Lepidoptera, and he also discussed with Dr. Böving the progress of the paper on classification of coleopterous larvae.

On July 20 Wm. T. Davis, from Staten Island, consulted with the specialists on Lepidoptera and also worked on cicadas at the National Museum.

Masaatsu Sugimoto, Professor of Parasitology and Veterinary Science, School of Agriculture and Forestry, Taihoku Imperial University, Japan, studied the collections of mites in the National Museum on July 20 and 21.

Dr. T. B. Mitchell, of Raleigh, N. C., spent July 29 in the section of Hymenoptera studying types of Megachile.

INSECT PEST SURVEY

F. D. Butcher, Extension Entomologist, is making an extended trip through a large portion of his territory. He will visit Missouri, Kansas, Colorado, Wyoming, Montana, Iowa, and Illinois. During this trip special attention is being given to the control of botflies. On August 13 to 16, he attended the meeting of the Great Plains Crop Pest Committee at Bozeman, Mont. He will return to Washington about September 30.

M. P. Jones attended the "potato tour" of the Eastern Shore of Virginia on June 18, of Maryland on June 19, and the 14th Annual Long Island tour on June 24 to 26. Several farms were visited on each tour and on each farm the operator had a demonstration plot to portray some of the better practices in potato growing, including seed selection, fertilization, and the control of insects and diseases. Mr. Jones considers the potato tour one of the best methods of passing experiment station results to the growers. He states that it is very gratifying to see the close cooperation which exists between the farmers, the extension workers, the research workers, and the commercial men.

P. D. Sanders, Extension Entomologist for the Cotton States, is making his initial trip for the Bureau. His itinerary includes eleven of the fourteen States in the territory assigned to him. He will return to Washington the middle of September.

BEE CULTURE

The Maryland State Beekeepers' Association held its annual summer meeting at the Somerset, Md., laboratory on June 20. Various members of the laboratory staff participated in the meeting.

At the Bee Culture Laboratory, Somerset, Md., work was begun in June on measuring the flight activity of the honeybee by means of photoelectric cells. Representatives of the American Instrument Company visited the Bee Culture Laboratory at Somerset on July 15 to demonstrate the use of their apparatus in making counts of the flight activity of the honeybee by means of photoelectric relays.

A study of the vitamin requirements of the honeybee and of the nitrogen changes in the body of the worker bee during life under normal and artificial conditions was also taken up.

J. E. Eckert, of the Intermountain States Bee Culture Field Laboratory, Laramie, Wyo., has renewed his studies on the effect of distance from a source of nectar on the production of honey. A new project being carried out by Dr. Eckert and Russel Smith, Field Assistant, has been started to determine the nectar and pollen plants in the vicinity of Laramie, together with the relative importance of each and their time of blooming. The third project being planned by Dr. A. P. Sturtevant and Doctor Eckert is to determine how far bees will fly to rob other hives. The specialists have in mind the question of the spread of American foul-brood.

The cooperative project between the Laramie laboratory and the Wyoming Experiment Station on the carbon dioxide metabolism of the honeybee was ended on June 30.

The apiary at Laramie now consists of 44 full colonies and 10 new colonies made up from packages of Caucasian bees received on June 11.

A report to this office from the Pacific Coast Bee Culture Field Laboratory, Davis, Calif., states that warm weather has started nectar secretion in the mountains up to 7,000 feet. A small amount of honey was coming in from star thistle, except in the valleys where the weather has been hot and too dry for this plant.

A queen of the Pacific Coast Black bees, supposedly of stock introduced by the Russians during their occupation of California, and which was secured by E. L. Sechrist and Frank E. Todd in the Coast mountains, has been introduced into a colony at the Davis, Calif., laboratory and is building up the colony successfully.

On June 24 and 25 Frank E. Todd and E. L. Sechrist, of the Davis, Calif., field laboratory, were in Stanislaus, Calaveras, Amador, and Eldorado Counties, Calif., making observations on the bees which had been moved into the buckeye territory. Two commercial apiaries, one of about 60 colonies and the other of 120, were seen which had suffered severely. An apiary of Carniolan-Italian bees located near the experimental Italians, which suffered severely, in the buckeye territory, did not show any symptoms of buckeye poisoning and is storing honey. The Carniolan-Italian cross at Three Rivers in Tulare County stored an average of 48 pounds per colony from buckeye and other flowers in the locality, with little loss of bees or brood.

The use of various crosses of bees in two buckeye regions to determine comparative immunity or susceptibility to buckeye poisoning has been completed at the Davis laboratory and one lot of bees has been moved to the "Mineral King" region in the mountains of Tulare County, to an elevation of about 7,000 feet, while the other lot was moved to Strawberry, in Eldorado County, where the elevation is about 2,600 feet. These two lots of bees are being given an opportunity to recover in the High Sierras and to gather nectar from the numerous plants now in bloom there. Scale hives are located with these bees. The scale hive at Strawberry built out foundation and gained 8 pounds in weight in three days after being located. The honey appears to be water white and an abundant flow is promised over a long period, as the prevailing honey plants bloom over a considerable variation in altitude--up to 8,000 feet. Records have been secured of the honey produced by these bees and of their condition at beginning and end of the buckeye honeyflow. Two queen bees from the Strawberry-Placerville lot of bees have been brought to Davis and introduced into nuclei for a study of their behavior in recovering from the buckeye poisoning, or to learn whether they do recover satisfactorily.

On June 2 to 9, George H. Vansell, of the Davis, Calif., field laboratory, investigated a serious outbreak of adult bee trouble near Yerington, in Mason Valley, Nev. There has been more or less of this disease every year since 1915, but this year the outbreak is more serious and has affected a territory having about 25,000 colonies of bees, rendering the most of them unprofitable this year, while numbers were completely destroyed. About 75 per cent of the bees have been afflicted. Normally this valley produced 8 or 9 carloads of fine comb honey yearly. Smith Valley, where there are a few cases, produces about half that quantity. On June 15 to 21 Mr. Vansell made a trip to Ventura, Los Angeles, and Orange Counties, Calif., where trouble apparently similar had arisen. He secured similar data there, as well as records of the weather since 1914.

On June 12 Messrs. Todd and Vansell were in Eldorado County, Calif., checking up on the dried fruit which had set in the pear orchards where experimental work with bees was being done.

Work at the field laboratory at Davis, Calif., during June included observations concerning the set of pears, and the "June drop" in the orchards in which package bees had been placed at blooming time, in other pear orchards where bees had been placed for pollination, and in near-by orchards where few or no honeybees had been found during the bloom time.

- A third candy-feeding test has been started at the Southern States Bee Culture Field Laboratory, Baton Rouge, La., using 200 Italian bees per cage, and 14 cages in the test. The candies used are plain candies of various boiling points and diatase candies of similar composition. One cage of each set is being fed water.

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